University of Idaho

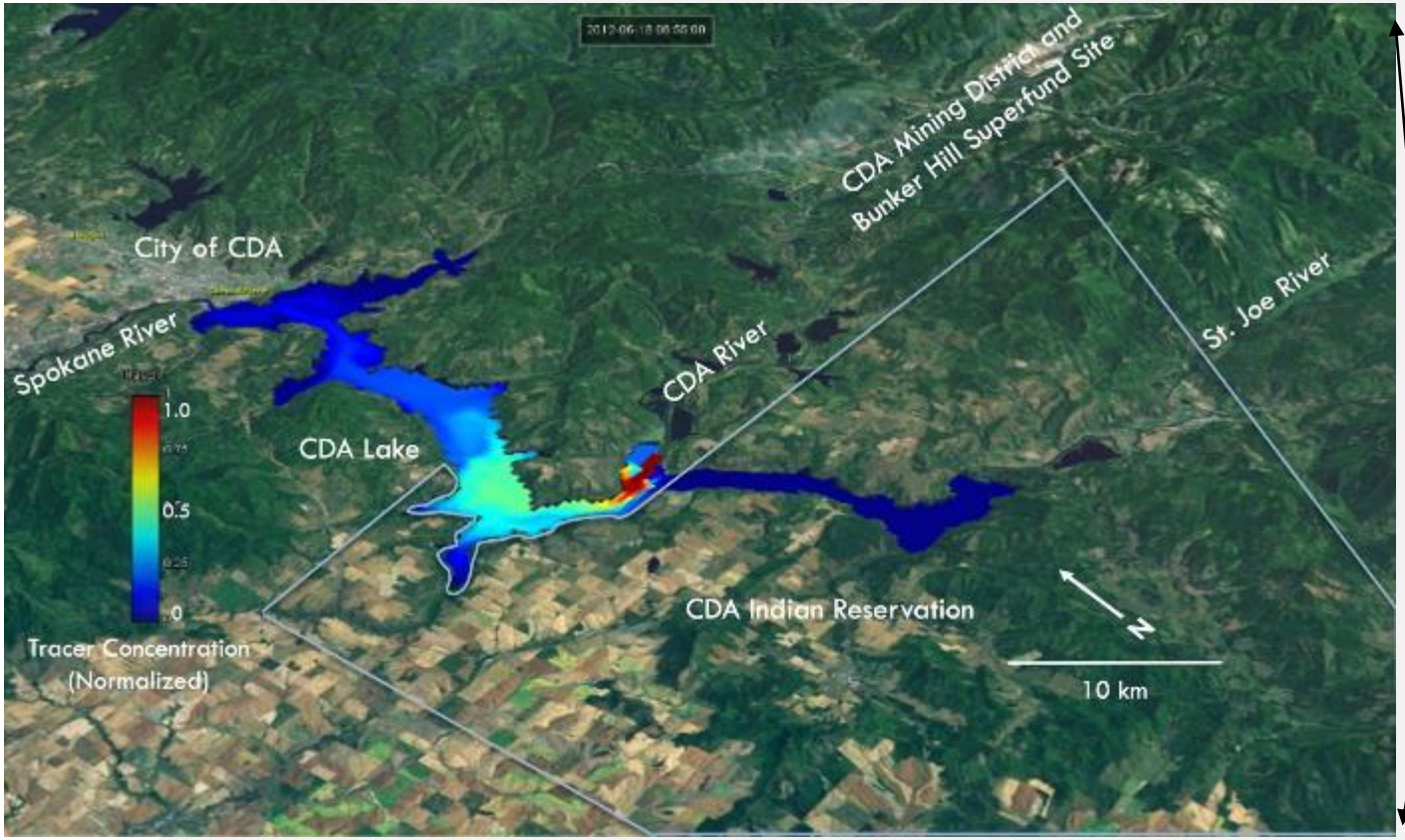
WATER QUALITY GOALS IN COLLISION: CERCLA v CWA

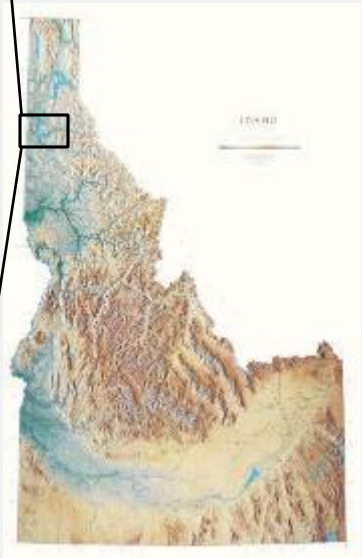
The Uncertain Case of Zinc in the Coeur d'Alene Basin

Mark Solomon, IWRRI Associate Director

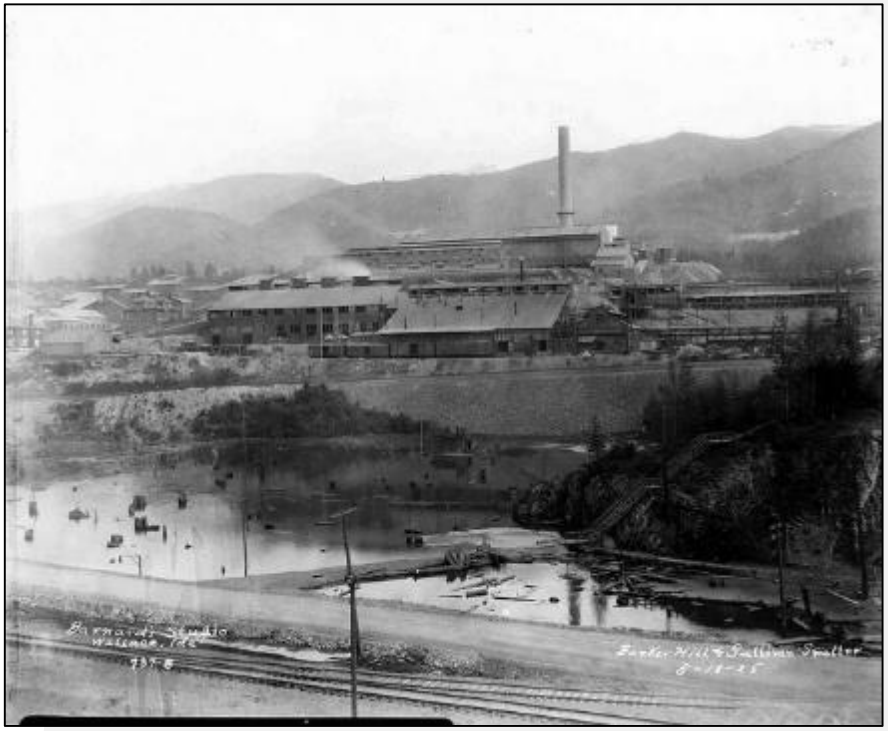
IWRRI
Idaho Water Resources Research Institute

Idaho's Coeur d'Alene Basin





Bunker Hill Mine and Smelter



(UI Digital Library)

Bunker Hill Mine

- 191 million ounces of silver
- 1.3 million tons of zinc
- 3 million tons of lead

Total Silver Valley Mining

- I billion ounces of silver
- 3 million tons of zinc
- 8 million tons of lead
- $17 billion (adj. for inflation)

(Bunker Hill Mining Corp.)

1992 –CERCLA cleanup begins

(Ron Swords: AP 5/26/96)

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)
aka “Superfund”

Cleanup funded by $665 million CERCLA settlement from Hecla Mining and Asarco (not Bunker Hill)

Meanwhile, downstream....

- >75 million metric tonnes of trace metal contaminated lakebed sediments (Pb, Cd, Zn)
- ~32 million metric tonnes still moving downstream to lake

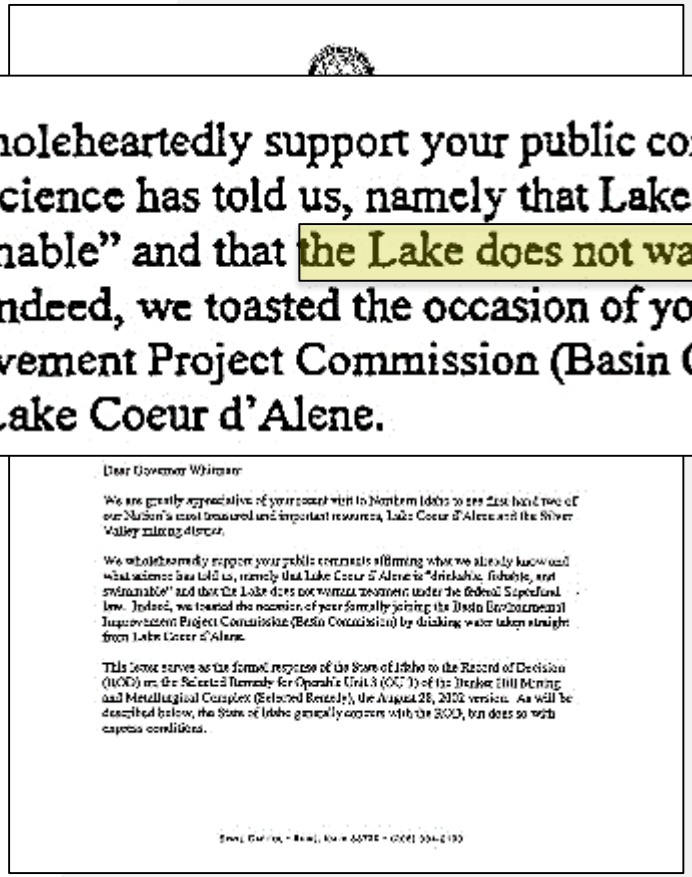
(USGS 2001)

Idaho, CERCLA and CDA Lake

We wholeheartedly support your public comments affirming what we already know and what science has told us, namely that Lake Coeur d'Alene is "drinkable, fishable, and swimmable" and that the Lake does not warrant treatment under the federal Superfund law. Indeed, we toasted the occasion of your formally joining the Basin Environmental Improvement Project Commission (Basin Commission) by drinking water taken straight from Lake Coeur d'Alene.

Sincerely,

DIRK KEMPTHORNE
Governor



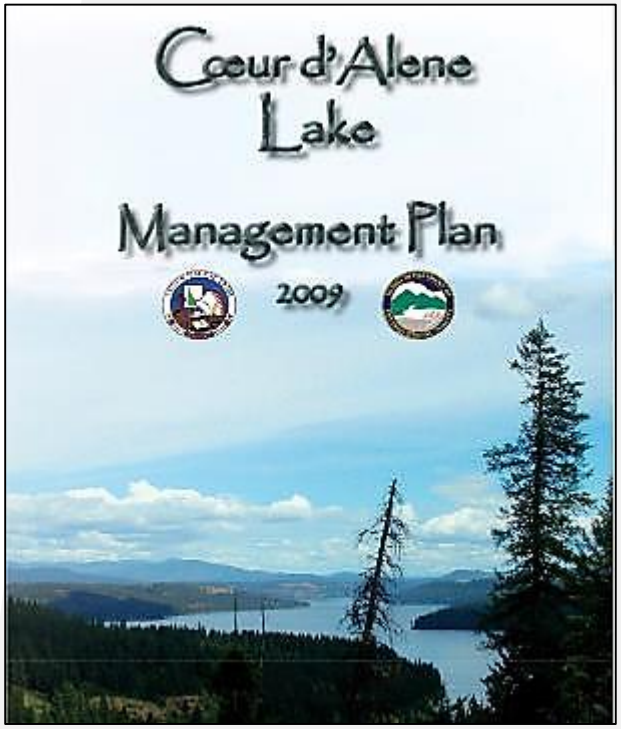
Dear Governor Whitman:

We are greatly appreciative of your recent visit to Northern Idaho to see first hand two of our Nation's most treasured and important resources, Lake Coeur d'Alene and the Silver Valley mining district.

We wholeheartedly support your public comments affirming what we already know and what science has told us, namely that Lake Coeur d'Alene is "drinkable, fishable, and swimmable" and that the Lake does not warrant treatment under the federal Superfund law. Indeed, we toasted the occasion of your formally joining the Basin Environmental Improvement Project Commission (Basin Commission) by drinking water taken straight from Lake Coeur d'Alene.

This letter serves as the formal response of the State of Idaho to the Record of Decision (ROD) on the Selected Remedy for Operable Unit 3 (OU 3) of the Bunker Hill Mining and Metallurgical Complex (Selected Remedy), the August 28, 2002 version. As will be described below, the State of Idaho generally concurs with the ROD, but does so with express conditions.

A nutrient-based shotgun marriage

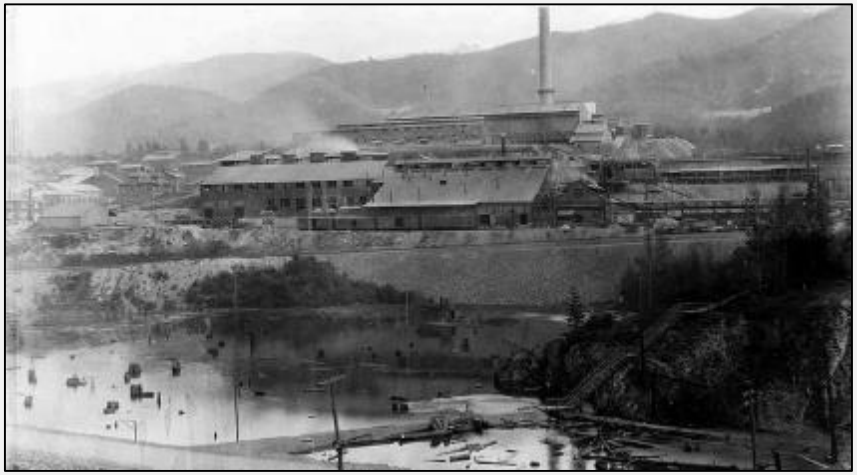


"Goal: protect and improve lake water quality by limiting basin-wide nutrient inputs that impair lake water quality conditions, which in turn influence the solubility of mining-related metals contamination contained in lake sediments."

Meanwhile, back in the box…

Remediation Goals:

- Reduce the concentrations and mass per day of metals discharged into Bunker Creek
- Achieve the TMDL and Idaho surface water quality criteria for lead, zinc, cadmium and arsenic in the SF CDA River

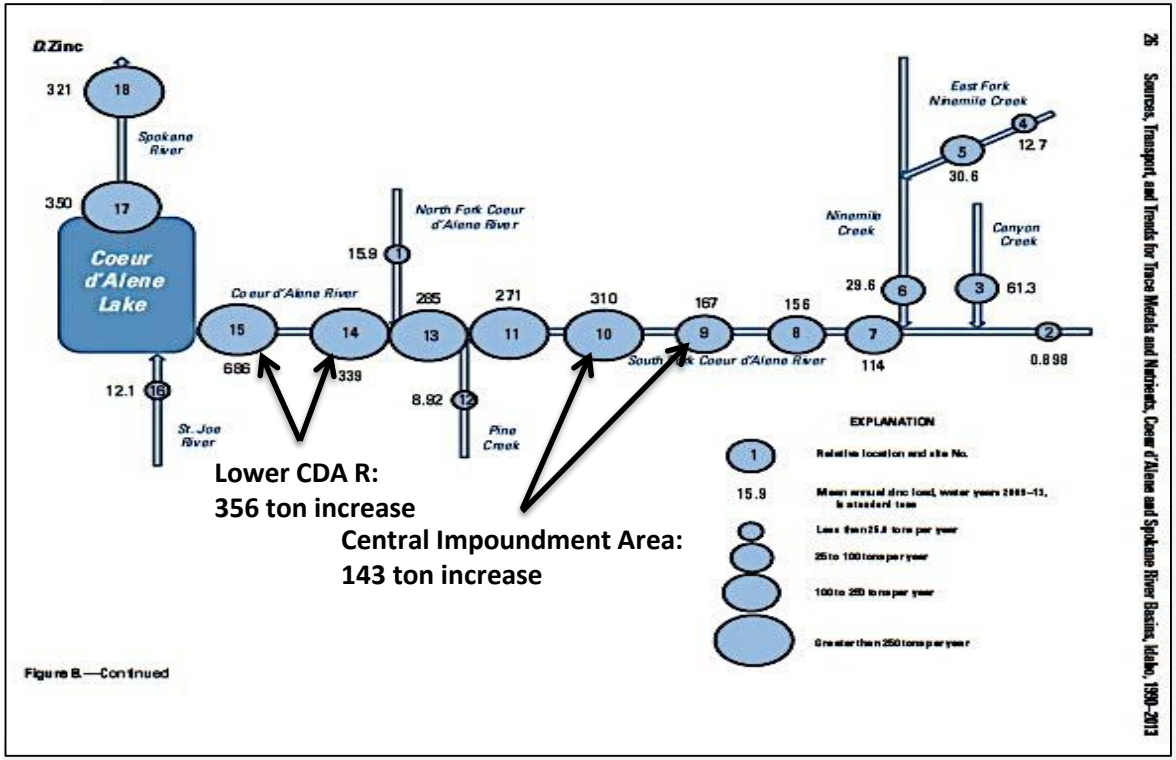


(UI Digital Library)

(Bunker Hill Mine Water Management RIFS April 2001)

(Daily Journal of Commerce)

Where does zinc enter the system?



Lower CDA R:
356 ton increase

Central Impoundment Area:
143 ton increase

(USGS 2014)

Reducing zinc in the river

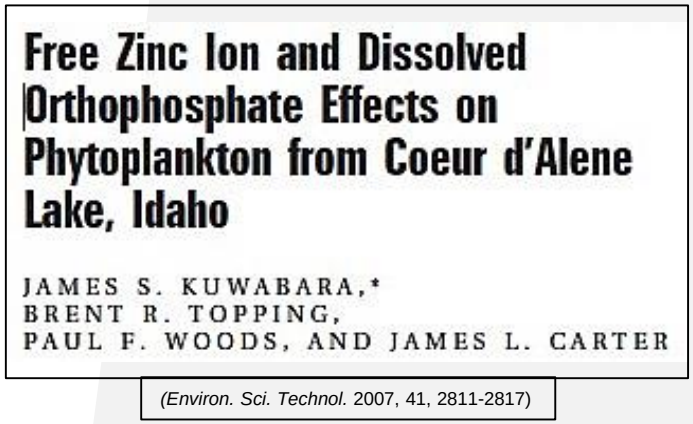
“When finished, the groundwater collection system and upgraded treatment plant will reduce the single highest source of dissolved zinc pollution to the South Fork of the Coeur d'Alene River by up to 90 percent.”

Sheryl Bilbrey, director of EPA's Superfund cleanup office in Seattle.

(USACOE 2016, 16-018)

The “64 billion dollar” question:

Will zinc reduction affect stability of deposited trace metals in Coeur d’Alene Lake?



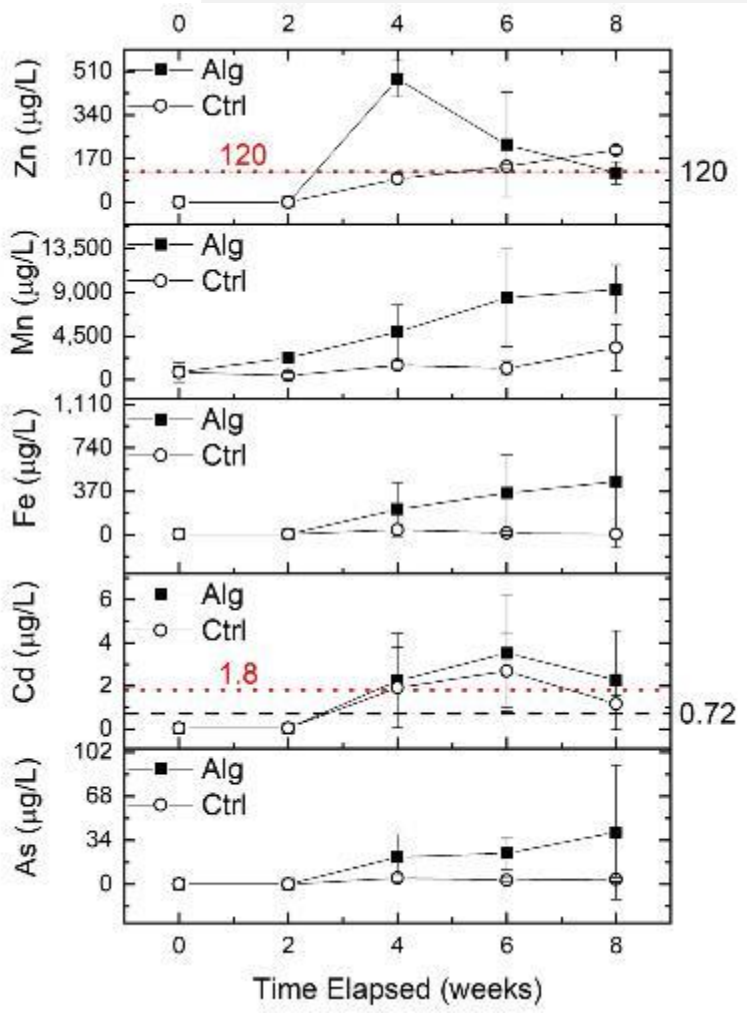
Free Zinc Ion and Dissolved Orthophosphate Effects on Phytoplankton from Coeur d'Alene Lake, Idaho

JAMES S. KUWABARA,*
BRENT R. TOPPING,
PAUL F. WOODS, AND JAMES L. CARTER

(Environ. Sci. Technol. 2007, 41, 2811-2817)

“Concerns expressed about potential changes in metal cycling within the lake due to future increases in anthropogenic phosphorus inputs to the lake are valid based on cell-yield results observed in this study.”

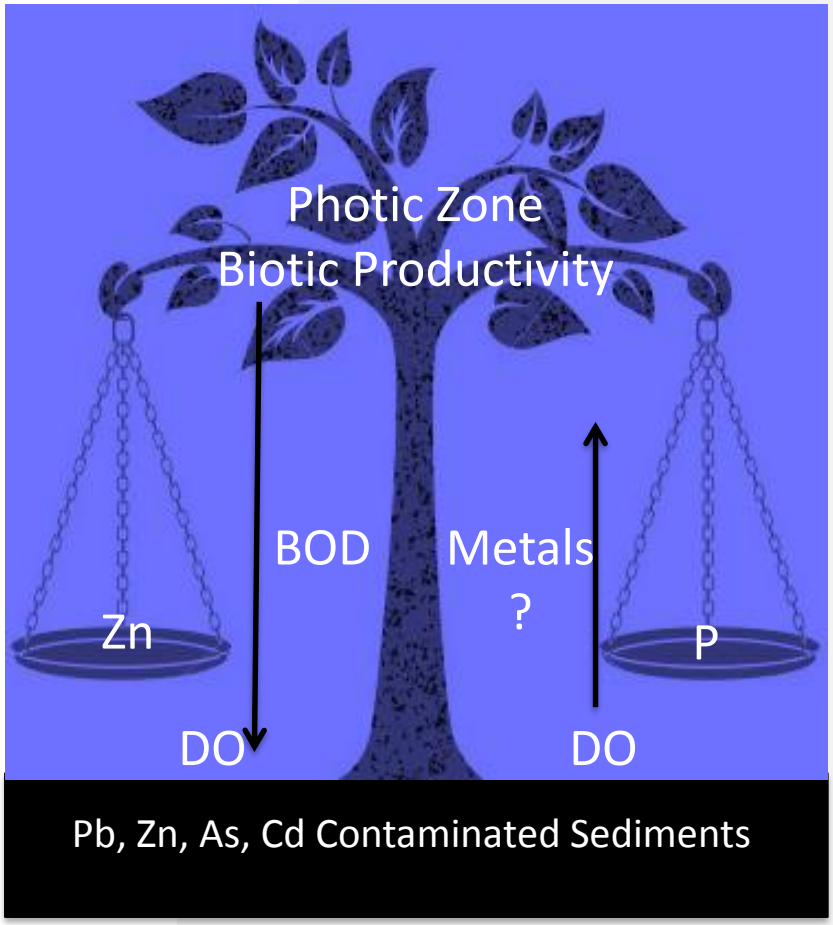
Reducing uncertainty



Temporal measurement of dissolved As, Cd, Fe, Mn, and Zn in column water during benchtop experiments exploring the potential for metal release from Lake CDA sediment with increased carbon input and reducing conditions.

Dashed black or dotted red horizontal lines for Cd and Zn indicate National Recommended Aquatic Life Criteria for chronic and acute exposure, respectively.

(Moberly 2018)



IF CERCLA remediation reduces Zn concentrations in CDA Lake to meet water quality standards, and
IF reducing CDA Lake zinc concentration increases lake biotic production, and
IF increased biotic production increases BOD in the hypolimnion, and
IF increased BOD raises the potential for benthic metals release, then

What is the legally (and ethically) appropriate management/regulatory response?

Regulatory Framework

Clean Water Act (CWA)

Three parts of a water quality standard:

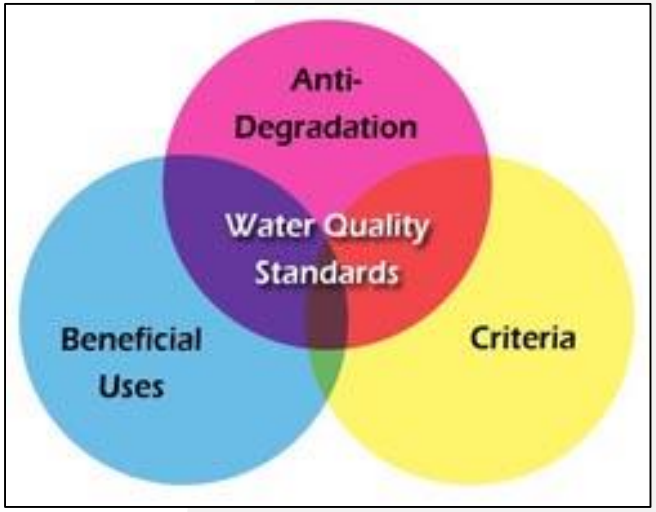
- Numeric criteria
- Beneficial use
- Where it applies

CERCLA

- Site Designation
- Remediation for public health
- Restoration for ecosystem function
- Remedial Investigation/Feasibility Study
- Record of Decision

Three Sovereigns

Change the Zinc WQS?



- Increasing allowable Zn concentration would need to show support of beneficial uses
- Current WQS is already site specific
- Current WQS is already adjusted for bioavailability based on SFCDA R hardness

Bottom line: Not likely

Manage to keep elevated Zinc in lake?

Put Zn back in the system by choosing not to treat captured groundwater at treatment plant

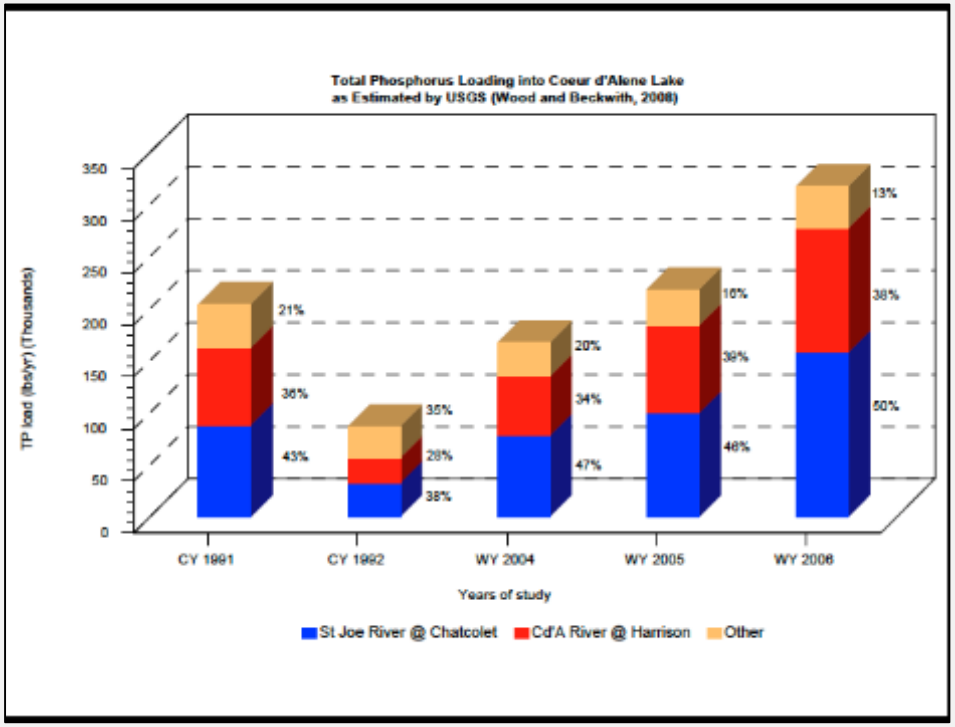
- Requires variance from WQS
- When granted, variances are temporary based on time needed to comply
- Variances may be renewed if reasonable progress toward meeting criteria is documented (IDAPA 58.01.02.260.01.d.ii)

(UI Digital Library)

What is “reasonable progress”?

Measured as potential for metals release:

- Reduce biotic production potential in CDA Lake?
  - Nutrient reduction
- Remove lakebed metals?
  - New Record of Decision
  - Billions of dollars



CERCLA v CWA: Can the lake win?